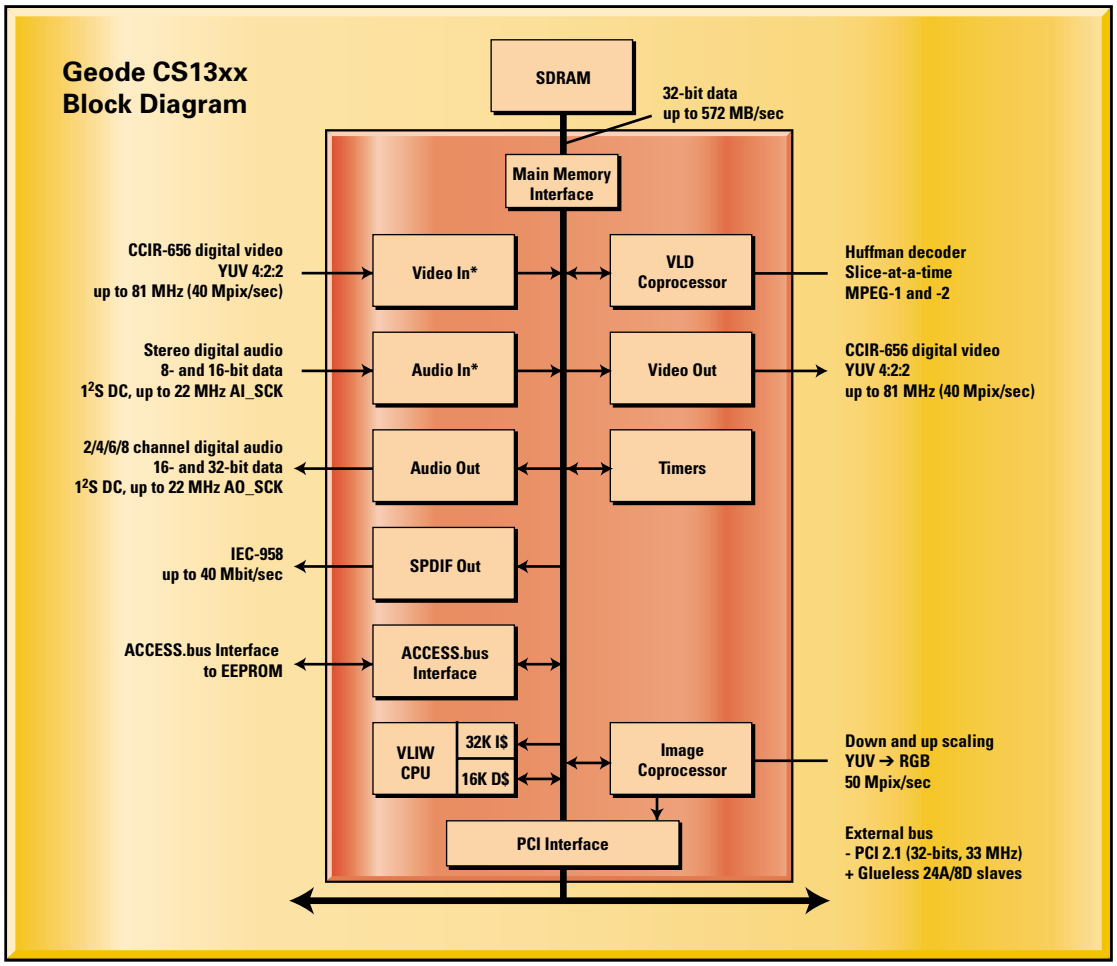
Geode™ CS1301/CS1311

Multimedia Companion



Multimedia Features

- Multimedia Companion for Geode™ SCx200 integrated processor which processes audio, video, graphics and communications datastreams
- Ideal for accelerating MPEG-2, -4, Windows Media™ audio & video decoding and encoding, and video conferencing
- Powerful, fine-grain parallel, 166 or 180 MHz VLIW CPU achieving up to 6.5 BOPS
- Up to 64 Mbit SDRAM support data up to 166 MHz
- TriMedia applications available from National Semiconductor and third party suppliers

For more information visit:
ia.national.com or
www.trimedia.com

The Geode™ CS13xx combines a 180 MHz, 2.5V (CS1301) or a 166 MHz, 2.2V (CS1311) CPU and a full complement of enhanced on-chip I/O and coprocessing units. The CS13xx achieves up to 6.5 billion operations per second – ideal for applications requiring real-time processing of video, audio, graphics, and communications datastreams. The CS13xx serves as a perfect multimedia companion to a Geode SCx200 integrated processor for media rich information appliances and entertainment on demand set-top boxes.

TriMedia Architecture – Programmable VLIW CPU

The Geode SCx200 and CS13xx solution strikes a perfect balance between cost, flexibility and performance. A powerful C/C++ programmable VLIW CPU coordinates on-chip activities. To reap the full benefit of the CPU, independent, on-chip, bus-mastering DMA peripheral units manage and format datastream I/O and accelerate processing of multimedia algorithms. A sophisticated memory hierarchy manages internal I/O and streamlines access to external memory.

*Software support to be provided by third party system integrators

National Semiconductor
The Sight & Sound of Information

Technical Specifications

National and TriMedia are creating the ideal solution for advanced multimedia applications. The combination of the Geode x86 compatibility with TriMedia media processing capability provides a flexible high-performance solution.

General Features

Physical

- Process 0.25-micron CMOS
- Packaging 292-pin TE-PBGA
- Power supply core: 2.5 V; I/O: 3.3 V (5 V tol.)
  – Typical max 1300 mA; 3.5 W
  – Idle 50 mW
- Case Temperature 0°C to 85°C

Central Processing Unit

- Clock speed 166 or 180 MHz
- Instruction length variable (2 to 23 bytes)
- Instruction set arithmetic and logical ops, load/store ops., special multimedia and DSP ops., IEEE compliant floating point ops.
- Functional units 27, pipelined

Caches

- Data 16 KB, instruction 32 KB

Memory System

- Speed up to 166 MHz SDRAM
- CPU/Memory programmable; 1:1, 5:4, 4:3, 3:2, and 2:1 speed ratios
- Memory size 512 KB to 64 MB (up to four banks)
- Recommended configurations:
  – 16 MB: 2 4Mx16 or 2 2Mx32
  – 32 MB: 4 2Mx32 or 4 4Mx16
- Width 32 bit bus
- Max. bandwidth 572 MB/sec (at 143 MHz)

Image Coprocessor

- Scaling programmable scale factor (0.2X to 10X) using 5-tap filters
  – Horizontal or vertical scaling and filtering of individual Y, U, or V
  – Horizontal scaling and filtering with color conversion and overlay
  – HYUV to RGB, RGB overlay and alpha blending, bit mask blanking

VLD Coprocessor

- Parses MPEG-1 and MPEG-2 elementary bitstreams generating run-level pairs and filling macroblock headers

Timers

- Four, 32 bit wide timers

Input/Output Support

PCI Interface

- PCI 2.1 compliant
- Speed 33 MHz
- Bus width 32 bits
- Voltage drive and receive at 3.3 V or 5 V

Audio In*

- 2 I2S compliant channels
- Sample size 8 or 16 bit samples per channel

Audio Out

- 8 I2S compliant channels
- Sample size 16 or 32 bit samples per channel

Video In*

- Supported signals CCIR-601/656:
  – 8 bit video (up to 40 Mpix/sec)
- Image sizes all sizes, subject to sample rate
- Provides programmable on-the-fly 2X horizontal resolution subsampling

Video Out

- Image sizes flexible, including CCIR-601; max. 4K x 4K pixels (subject to 80 MB/sec data rate)
- Outputs CCIR-601/656 8 bit video, PAL or NTSC
- Clock rates programmable (4-80 MHz), typ. 27 MB/sec (13.5 Mpixels/sec for NTSC, PAL)
- Transfer speeds up to 80 MB/sec in data-streaming and message passing modes; 40 Mpix/sec in YUV 4:2:2 mode
- Features full 129-level alpha blending, genlock mode, frame synchronization, chroma key, programmable
- YUV color clipping

SPDIF Out

- Number of channels up to 6
- Sample size 16 or 24 bits per channel
- IEC-958, output up to 40 Mbits/sec

ACCESS.bus Interface

- Supported modes single master only
- Addressing 7 bit
- Rates up to 400 kbps

*Software support to be provided by third party system integrators

National Semiconductor
2900 Semiconductor Drive
PO Box 58090
Santa Clara, CA 95052
1 408 721 5000

Visit our web site at:
ia.national.com

For more information, send email to:
new.feedback@nsc.com

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